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ABSTRACT

This research examined the nature of the "self-fulfilling prophecy" by investigating how the gradual accumulation of information and the relationship of the source and content of information may affect teachers' perceptions and ratings of trust, social ability, and academic ability of individual students. The study sought to answer two primary questions: (1) Do teachers as a group use new information to readjust their expectancies of students rather than form quick and stable expectancies on the basis of a few initial cues? and (2) Are some information sources held in higher esteem than others by teachers and, if so, what influence does this information have on the expectancy that is formed by the teachers? The study emerged from the Cognitive Information Processing/Social Interaction (CIP/SI) model, which considers the source/content dyad and the context as components of the system by which humans develop expectancies. Information content and source are manipulated in order that both their independent and interactive effects can be measured. Subjects were 240 elementary inservice teachers in Kentucky. Teachers were asked to rate a hypothetical student on three opinion or attitude scales of (1) trust, (2) social ability, and (3) academic ability. The rating took place after the viewing of a silent videotape of a child in a classroom situation and again after successive bits of information were added to the situation. The data analyses revealed evidence that suggests that teachers as a group constantly use new information to readjust their expectancies of students. Question two was not answered. (A summary of an extensive literature review on bias expectancies is included). (MM)

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A COGNITIVE AND COMMUNICATIONS
SYSTEM OF BEHAVIOR

by

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This paper is the result of the author attempting to gain an understanding of the problems and nature of the so called self-fulfilling prophecy. Being aware that past studies dealing with bias expectancies and the self-fulfilling prophecy had produced some controversy, an extensive literature review was performed in an attempt to decipher the common points of agreement and disagreement as described by past research. The review of the literature did indicate some consistent weaknesses that led to the synthesis of conceptual models of behavior presented in this paper.

Before presenting the models a summary of the literature review will be presented, as well as a mention of what seems to be the consistent weakness borne out by the results of past research.

Perceived Results of Past Research

The studies and theories reviewed convey the notion that differential academic achievement is to some extent the result of biased expectancies. Nowhere in the past research, save for Finn's (1972) brief treatment, are expectancies seen as normal and rational strategies used by everyone to cope with their environments. The literature also reveals that inadequate attention has been directed toward understanding of how multiple and cumulative sources of information act in the development of expectancies and attitudes, both biased and rational, in spite of suggestions that this is an area that needs attention. For example, Barclay (1970) says:

"There is mounting evidence that perceived expectations as manifested in both non-verbal, verbal and behavioral communications may function as a major source of variance in both achievement and social learning." (p. 3)

In the area of expectancy theory and research, inadequate attention has been directed toward the fact that children actually do vary in skills, values and abilities, and that the performance of individuals differing in one or all three of those are often times the result of differential conditions which are external to school. Although such individual differences in skills, values, ability and performance can be, and are in many instances, valid bases for the prediction of future probable success in academic tasks, in the literature of expectancy phenomena this realistic constraint has been greatly ignored.

Throughout the literature there is a tendency to label teachers as being biased when they struggle to assess the academic potential of individual children according to typical and available criteria. Nowhere does the literature suggest the possibility that what is being observed are teachers who, as well as possible given the available information, are trying to make a traditional instructional diagnosis of the individual child. This is an essential task commonly called for in the justification of individualized instruction. In only a few of those observational studies dealing with naturally developed bias, where no induction of false information occurs, is consideration given to the possibility that observed expectancies could be the result of very rational and normal processes based upon valid criteria (Doyle, Hancock & Kifer, 1972). It is, in fact, wrong to fault teachers as being "biased" or "bad" for recognizing limitations placed on students by experiential variables and cultural institutions over which the teacher, or the schools, have no control.

There are portions of the research that suggest that many teachers become withdrawn, exhibit apathy, or simply give up on children with apparent or alleged cultural and learning deficits. "Giving up" or feelings of impotence on the part of the teacher even though they may be the result of accurate, false or irrelevant information, is none the less damaging to the children concerned, and that is the real culprit rather than the so-called biased expectancies which could be quite rational predictions.

There is no denying that some teachers, perhaps all to varying degrees, do exhibit stereotypic thinking patterns and do react to particular cues or information irrationally. It is logical to believe that in these cases teachers' diagnoses, prescriptions and judgments of student performance are strongly biased either positively or negatively. In cases such as this, the rhetoric about the self-fulfilling prophecy may be correct. The literature is scant with information about the nature of valid information and methods of forming predictions about students for the purpose of making decisions about how to most effectively interact with and teach them.

It seems, then, that most conceptualizations and research about teacher expectancy have dealt incompletely and superficially with the broader and more important issues of conceptualization of the epistemology and etiology of expectancies, favoring, instead a study of peripheral manifestations of the phenomena. Models or paradigms of expectancy used in educational research in general, have been similarly too limited and limiting. What is needed are models more consistent with the complex reality of the teacher's classroom milieu. Such models

should be flexible enough to deal with a range of problems characterized by the complexity of real world cognitive functioning and social interaction.

Criticisms of the Logic of Expectancy Models

Jensen (1969) in one of the first criticisms of the original Pygmalion said that too much concern was spent with finding statistical significance rather than attempting to explain the phenomenon of expectancy. With few exceptions, the research based in the educational setting is void of serious attempts at explaining the phenomenon in any greater detail than does the general notion originally suggested by Rosenthal and Jacobson (1966, 1968). Consequently, most of the research seems to be based on hit and miss combinations of reference variables without any underlying general schema, model, or paradigm by which to properly design studies and interpret their results.

The failure of replication (Claiborn, 1969; José & Cody, 1971) and massive quantitative criticism (Barber & Silver, 1969a; Jensen, 1969; Thorndike, 1968) seem to indicate the need for a conceptual model, or models, of expectancy that possess the ability of explaining the phenomenon's etiology and epistemology. In fact, it was not until Brophy and Good (1970) that any attempt was made by educational researchers, to develop a conceptual model. Brophy and Good (1970) recognized this void when they said:

"The lack of data concerning the causal mechanisms at work in the Rosenthal and Jacobson study, combined with the tendency in most secondary sources to oversimplify or exaggerate their findings has cast an aura of magic or mystery around expectation effects. Consequently, it is important to conceptualize such phenomena as outcomes of observable sequences of behavior." (p. 2)

While the Brophy and Good model is an improvement over its predecessors, it contains acknowledged inadequacies that limit its value as a research vehicle. The model assumes as a first step that teachers form differential expectations for student performance. This is probably an accurate assumption; however, it fails to suggest the causal mechanisms at work, a need its designers admit is necessary for understanding the phenomenon. What, for instance, are the causal conditions in forming differential expectancies? The rest of the model infers that children act differently because the teacher treats them differentially, and as the result some children's academic performance will be enhanced while others will be depressed. Subsequently, the effects will show up at the end of the year on achievement tests, thus giving support for the "self-fulfilling prophecy" notion.

The Brophy and Good model does not acknowledge the possibility that differential expectations are isomorphic with reality, and are not necessarily initially false. Surely teachers' attitudes are not totally irrationally and totally biased. Surely not all children have equal academic aptitude, and surely all children do not strive to exhibit behavior that complements and reinforces the teacher's particular expectations for him, or her. Anyone who has spent time in the classroom, as a teacher and as a student, can attest to the fact that teacher-student interactions are not so easily described. Fleming and Anttonen (1971) found that teachers were not easily deceived by false information and suggest that day to day living with the academic performance and behavior of children provides greater influence than any single biasing bit of information.

The Brophy and Good model also does not possess the ability to account for or explain the dynamic interaction between the various stimuli present in the social and classroom milieu--a characteristic essential in the description of behavioral phenomena.

Mason (1972a) after a review of the theoretical and empirical work which had been done in the field of teacher expectancies, developed a model which attempts to account for the interaction between teacher and child and the subsequent effect upon the teacher's original expectations that were based on preliminary concrete information. Mason allows for a cyclic system of expectancy adjustment that results from teacher-student interaction.

In step 3 of the Mason model there seems to be an implication that all information is biased. As Mason says:

"Very often the expectations process may begin with Step III with biases being furnished to the teacher by some source, for example, a psychologist's report, notes from a previous teacher, or some form of special education class labeling." (p. 5)

The exact meaning of the above quotation is dependent upon the connotation that bias is to assume. If Mason's intention is for biases to assume the meaning inherent in electronics, then the quote simply means that expectations are influenced by some external force, much the way a high voltage supply is effected by passing through an external electromagnetic field. On the other hand, if he intends for bias to mean false information or the illogical use of information to make irrational inferences, then all teacher-assigned grades

and achievement test scores are viewed as manifestations of the self-fulfilling prophecy. Again, as in the Brophy and Good model, no clear cut provision is made for rational expectancies, that is, expectancies that imply the anticipation of the behavior most likely to occur, given the individual and a set of circumstances (Finn, 1972).

Neither the Brophy and Good nor Mason models provide any reference of the position of their respective models in relation to a universal system of human behavior and cognition. This failure is what Rapoport and Horvath (1968) speak of as the problem of assuming that a complex phenomenon can be understood by treating it as if it can be "broken up. . . into a temporal chain of events, all connected by determinant 'causal' relations." Finn's (1972) expectation network does recognize the influence of the total social milieu, and some attempt is made to describe the phenomenon of expectancy as an interactive system. The graphic illustration of Finn's model does indicate the importance of many variables, including cultural traditions, perceived characteristics of the individual and expectancies of others. However, while the Finn model is capable of providing insight into how these various variables interact, especially in a cumulative way, and the relative influence of each, yet the verbal description it provides of the phenomenon is little more than stating that individuals are affected by one another as well as by their social milieu.

Finn (1972), as well as Jose and Cody (1971), and Fleming and Anttonen (1971), note the importance of understanding the strength and characteristics of information that allows the creation and maintenance of an expectancy, or expectancies. This problem seems to be

especially evident in the results of those studies that attempt to induce a false expectancy or attitude and use the child's achievement as the measuring unit. Because this type of study is concerned with student-teacher interaction over time, the unstable results tend to make one believe that multiple sources of information received first hand and redundantly are much more powerful than any single source of information can ever be. In fact the duration of time and events over which an expectancy builds seems to be an extremely important variable that has as yet not been given adequate consideration in experimental studies or theoretic conceptualizations. It seems that the shorter the duration between the induction of bias and the measure of effects the greater the influence of the induced information (Beez, 1968; Claiborn, 1969; Jose & Cody, 1971). This evidence suggests that teachers, like most others, constantly adjust their expectations according to perceived first hand information in a continuous and cumulative fashion, perhaps toward some limit of no further change in perception after many observations and interactions with the student. Therefore, in order for a self-fulfilling prophecy to be manifest, a series of false or irrelevant inter-supporting information events would have to be presented over time (Cahen, 1966).

In spite of what appears to be the lack of a systematic approach to the study of expectancy phenomena, some important information has surfaced. For example, Beez (1968), Rothbart, Dalfen and Barrett (1971) and Kester and Letchworth (1972), found that teachers interact more with those students whom they think are brighter. Differential treatment has also been noted by sex (Brophy & Good, 1974). It seems

that boys are usually seen to have more problems within the academic setting. Physical attractiveness also seems to elicit a constant effect (Berscheid & Walster, 1972; Efran, 1974; Kehle, 1972). Children possessing a high degree of physical attractiveness are perceived as being smarter and more successful by their teachers and peers than are their less attractive counterparts.

The research implies that considerations of physical attractiveness, sex, SES, and related variables are biased and that the individuals resulting behavior is the manifestation of the self-fulfilling prophecy. If one objectively considers real life indices of success, then judgments via these characteristics may not be biased at all if no more importance is placed on them than on any other index. For example, with everything else being equal, such as professional and interpersonal competence, the more attractive person will usually win the competition for the job. The many beauty contests, homecoming queens, cheerleaders, as well as the amount of money spent attempting to improve physical appearances, attest to the importance that current American culture places on physical attractiveness. After all, throughout the animal kingdom the functionally best physical specimens are the ones that most often survive. It seems that physical attractiveness is inherent in our concept of physical superiority, and hence an indication of probable success, survival and security. Of course, what is attractive varies from culture to culture. Since there is no such entity as universal physical attractiveness, then it is a judgment probably based on selected characteristics peculiar to the norms of a specific society, culture or ethnic group, and while beauty may have no

rational relationship to performance on most tasks, it may have direct influence on performance by virtue of the importance of beauty or a cultural norm which does influence the degree and quality of interaction between an individual and those he or she works with. For example, our notions of physical attractiveness may influence which sales person we as customers seek out in a shoe store and consequently how successful various sales persons are.

It is thought (Bloom, 1964; Hurlock, 1968; and Mussen, 1963) that differential physiological development rates exist for the sexes. Central nervous system maturation is accelerated for girls, compared to boys. This fact means that girls probably hold a cognitive as well as a physiological edge over boys, possibly even maintaining this advantage through high school, although research shows reversal at high school in academic superiority of females, probably because of differential sex role norms (Gage & Berliner, 1975, chapter 20). Perceived academic necessities may be expected to be handled better by individuals possessing the greater degree of central nervous system maturation, and consequently may explain the generally superior academic performance of girls compared to boys in the elementary and junior high years.

It is also realistic to expect weaker academic performance from a child from an impoverished or significantly non-nurturant social environment. Whether we like it or not, economic level is an indication of the functional power of one's coping strategies (McClelland, 1973). The preschool learning of middle class values accelerates a student over other students who have not learned basic skills prerequisite

to academic success, such as the abilities to attend, to express ideas in verbal statements, and to seek assistance from adults in academic tasks. For it is around these values and skills that public schools are designed, and it is these values and skills that are further taught and rewarded in school, and it is these values and skills that are recognized by society as important criteria necessary to being employed or attending college. It is precisely to develop, nurture, and remediate these skills that head start, upward bound and other compensatory educational programs have been developed.

It would seem, then, that considerations of these individual differences in children's skills and values learned in the home and community do realistically lead to differential expectations for these children in terms of their probably academic success. It does not seem realistic to think that teachers are initially biased simply because they are aware of the skill deficits a child may have, and are aware that the child's values are not directed toward academic achievement. Teachers observing such children can quite realistically predict and rationally expect the children to have difficulties in academic work. Similarly, teachers observing such children can quite realistically predict and rationally expect the children to have difficulties in academic work. At the same time, teachers should not "give up" on such students or think of them as innately inferior. Quite the contrary--they need to work harder to teach the basic skills which are lacking in these children. Expectancies based on SES are group normative concepts. Individuals often do not exhibit "mean" behavior. Therefore teachers need to remember not to categorize, or

assign a child a given role or achievement outcome on the basis of a rationale based on a normative expectancy - to do so violates a basic principle of individual differences. What seems very inappropriate, however, is to fault the teacher for having a "negative" expectancy when, in fact, the teacher is simply recognizing the quite probable and logical consequences of social injustices and inadequate nurturance which have been perpetrated upon the child and his family by many other groups and institutions in society, as for example in studies of expectancy when the teacher is asked to assign a probable grade to a child at the end of a year given only information about the child's SES. On the other hand, teachers can be negatively biased and fail to try to teach or deny the student the help and attention he needs. Teachers can become biased by ignoring the dissonance created by conflicting information. Unfortunately, the body of research on expectancy phenomena has not directly concerned itself with this consideration, that is, where there is serious mention of the effects of double bind communications, and the lack of communications. These are important possible antecedents of biased expectancies, though not necessarily intentionally biased.

Inadequacy of S-R Models

Breger and McGaugh (1965), Efran and Marcia (1967), Byrne, Rasche and Kelley (1974), Anderson (1971), and Wyer (1973) suggest that S-R learning theory does not possess the capacity to describe and subsequently explain the learning process and the ultimate behavior of a linguistic animal. MacCorquodale and Meehl (1953), critiquing their own S-R expectancy theory, described the inability of their model to

describe interaction among expectancies. They place the cause for this inability as an inherent weakness in S-R learning theory. However, despite suggestions and evidence for the need of additional considerations, educational research in the area of expectancy phenomena for the most part has tenaciously remained based in S-R learning theory.

Some studies outside of the educational setting (Bregger & McGaugh, 1965; Efran & Marcia, 1967; Sears & Freedman, 1965) have not remained so rigidly based in S-R theory, have suggested and produced possible methods and descriptions of how humans learn, and consequently how expectancies are caused and developed. For example, the notion of communicator-content effects of information put forward by Hovland (1957) and partially supported by Krumboltz and Varenhorst (1955), Efran (1974), Byrne, Rasche and Kelley (1974) and Sears and Freedman (1965) provides such description. Also, the notion of stimuli as information rather than reinforcement has been the recipient of attention. The importance of this consideration is that an information processing schema can consider interactions among multiple sources of input and also cumulative effects on the development and refinement of various cognitive schema.

The greatest failure of educational expectancy research has been the lack of a concerted effort to describe the etiology and epistemology of expectancies. This failure not only allows further assumptions without a logical base, but so greatly amplifies confounding of effect and error of measurement as to render outcomes that are useless, contradictory, and not interpretable.

A second problem of educational expectancy research is a cognitive fixedness that has prevented many researchers from considering various conceptualizations of expectancy. This has, in turn, prevented a synthesis of new theories and models of expectancy that might better explain the phenomenon. In light of so many different possible avenues of consideration that are available, it is amazing that conceptualization of expectancy theory, as it operates in teaching and learning, has remained so sterile in efforts to explain and understand the ability of false information to cause the self-fulfilling prophecy.

A System of Cognition and Communication

As previously noted many problems were identified that were at least partly due to the absence of any systematic description of the cause and development of expectancies. The purpose of the following is to develop a general system of cognition generally based on facts and theories already presented in the literature. The attempt is to invent and describe the system that this information and the conflicting empirical research results seem to suggest.

Need and Basis for a Cognitive Conceptualization

There are two immediate needs that the system attempts to satisfy. First it possesses the capacity both to place existing research results into categories that will assist in the logical interpretation of prior studies and to direct new research efforts. Second, if used properly, the system should reduce the multiple conceptualizations of different research paradigms such as expectancies, attitudes, and emotions into a single more parsimonious conceptualization.

Man has been successful at describing and defining some categories of behavior and learning traits of infrahuman species. This success is the result of objective observation and the fact that much behavior is systematic. Man has not been nearly as successful at

describing his own behavior, not because much of his behavior is not systematic, but because man finds it difficult to be objective about himself and because he has not adequately considered the importance of language. Polanyi (1958) says:

"Our intellectual superiority over the animals is almost entirely due to our powers of symbolic operations; it is only by relying on these that we are able to carry out any process of consecutive reasoning." (p. 257)

Chomsky (1968) puts forward the notion that human language is a communication system that is unique to the species, and is indeed not an extension of infrahuman communication. His basis for this notion is a belief that humans are born with an innate linguistic decoding ability. Piag t (1967), while maintaining his interest in prelinguistic cognition, does recognize the extreme influence of language on human cognition. In an attempt to describe the part played by language on cognition Vygotsky (1962) says that the chief determinant of an individual's cognitive format is, indeed, the design of one's language, that is after the acquisition of linguistic skills by an individual.

The contribution of human language to human behavior is of sufficient magnitude to produce a coping system unique to our species. It is this coping system that directs thinking and consequently directs interpersonal behavior. If the system is unique, the descriptors of another system of infrahuman behavior are not adequate for its description and understanding. Attempts at explaining the more complex by the properties of the least complex system are somewhat analogous to equating balloon flight to the powered flight of heavier than air vehicles. While both have somewhat similar capabilities, each generates these capabilities through different physical

principles and technological systems. Therefore they cannot be identically described.

Inherent in reinforcement theory is the notion that stimuli act as reinforcers and that simple learning takes place after a redundancy of the same or highly similar stimulus-response sets, particularly when the response leads to some satisfying consequence to the organism. Complex learning is subsequently described in terms of chaining, the connecting together of discrete but related S-R sets. Chaining suggests some notion of a Gestalt. Nothing is suggested, however, as to the mechanics of interaction among these discrete elements of experience. Yet it is this valuing, weighting and combining of discrete experiential events into complex skills and emotions that makes human behavior so complex.

Language is of sufficient importance in human behavior that its contribution to thinking should be included in any model of complex cognitive and social interaction. Kaplan and Anderson (1973) recognize the role of language in cognition in their assumption that stimuli act as informers and not as reinforcers, the end result being the development of cognitive coping schemes. Tolman (1932) with his notion of purposive behavior said much the same thing. (The assumption here is that cognitive schemas are a more isomorphic perception of events and conditions of most human learning and behavior than are those models which pose simple S-R associations and chains derived from research on animal and human learning paradigms.) There is a qualitative difference in these two views of learning and behavior.

The notion of human thinking presented by the models in this paper are not unique. An emerging point of view in the study of human interaction and group processes focuses on ideas and concepts about communication which are viewed broadly as dealing with any behavior, verbal or nonverbal, that may affect another. This movement is known as "metacommunication" (Watzlawick, Beavin & Jackson, 1967). The theory draws on the work of Bateson's (1960) communication theory of schizophrenia, the work of psychiatrist Jackson (Buckley, 1968), and the efforts of systems theorists Ashby and Bertalanffy (Buckley, 1968). Metacommunication is essentially a search for the underlying rules governing interaction of an intelligent organism with all aspects of the environment.

According to metacommunication theory, any communication conveys both content and information as to how the content is to be perceived and used. How the content is to be perceived is strongly influenced by the relationship of the individuals communicating. This relationship sometimes can be understood only through the context in which the communication takes place. The question "What is your name?" will not mean the same thing at a party as it does in a courtroom. Additionally, meaning can change as number of communicators changes. Consequently much human behavior may be considered to result from an individual attempting to cope with future events (plans, expectancies) of his/her environment according to the perception of the total information being communicated, past and present, to the individual by that environment. Language is extremely important in providing discrete bits of information, but by no means is it the total supplier of

information. The basis of the system must reside in a notion of information processing, its communication and its utilization. This consequently leads to the rejection of the notion that stimuli act simply as reinforcers.

A Cognitive Information Processing Model

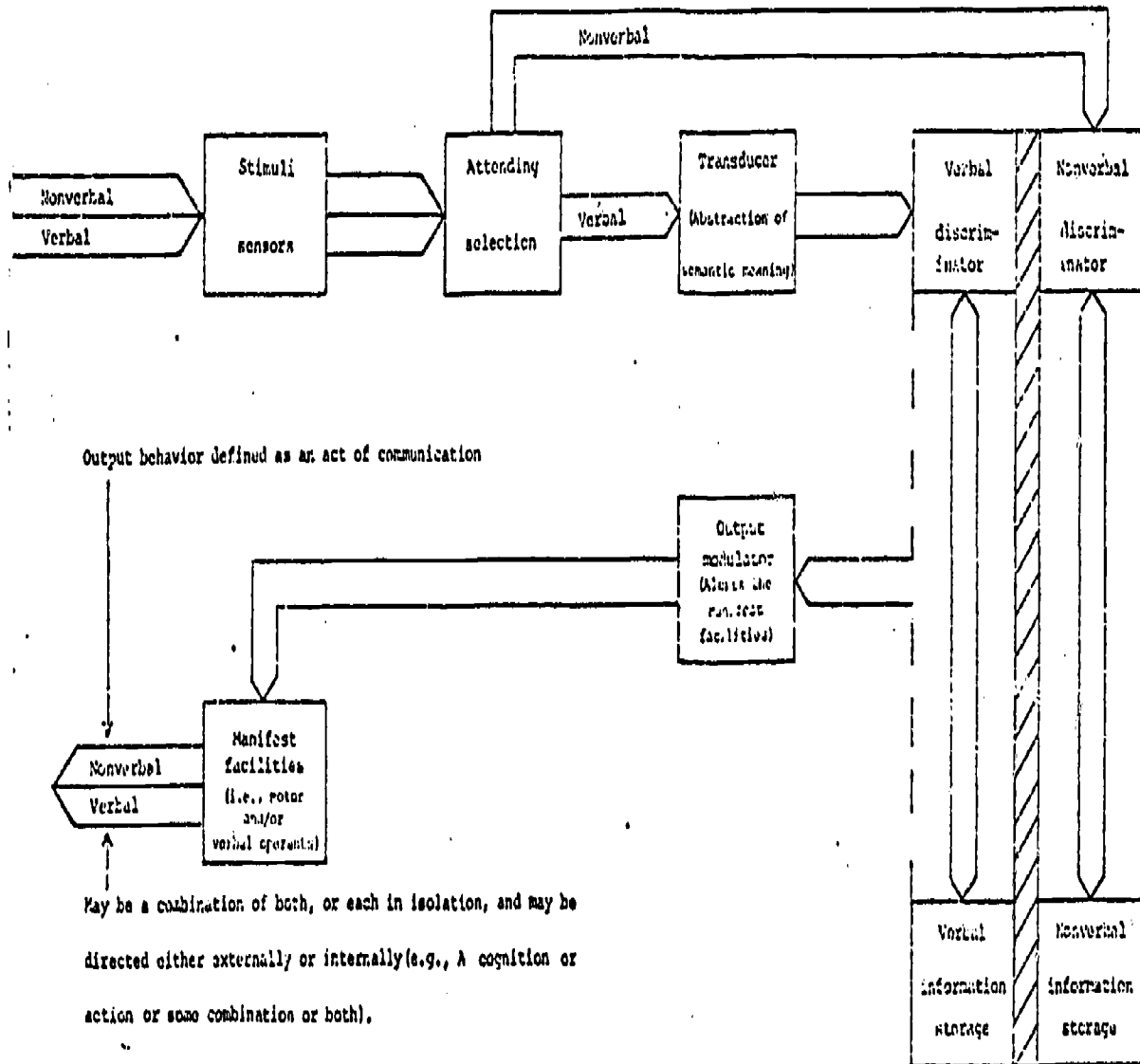
The use of the cognitive information processing model (CIP) to explain individual within person information processing is first explained. The model is not restricted to this application. Explanation of how the model applies to both internal information processing and the products resulting from behavioral, conceptual, and attitudinal interaction with environmental events is subsequently explained. Systems diagrams are presented as graphic representations of the social extension of the CIP model.

Analog and Symbolic Information and Its Processing

According to metacommunication theory there are two basic and discrete types of communication possible, verbal and nonverbal. Although it is possible for only one type to take place in isolation, because of the complexity of most individuals' social milieus, both verbal and nonverbal communications are taking place concomitantly. This means that in most information processing situations an individual is carrying on two separate operations concurrently (see Figure 1). These processes are analogous to the differentiation between digital and analogical computers. Digital computers use the all-or-none principle to register information with electronic equipment. Digital computer's programs, therefore, are abstract and arbitrary and can

Figure 1

Cognitive Information Process Model (CIP)



refer to anything which can be arranged as binary (yes-no) bits of information. Language is similar in that words are abstract and arbitrary and are used according to some particular order, essentially a conventional order (Attneave, 1974). Conventions vary with various groups of people. When the conventions are developed from totally discrete bases, we call these sets of conventions languages. This is true for humans as well as for digital computers. Due to various reasons such as long-term isolation and geographic idiosyncrasies, intralanguage variances develop which are called dialects. This is true for human languages as well as computer languages.

Whorf (1941), Vygotsky (1962) and Breger and McGaugh (1965) suggest that the chief determinant of the cognitive schema format is the grammar that is acquired by an individual in the learning of a language. This includes significant variations at the dialect level. If this is so and because language is observable it should be possible to gain great insight into the human cognitive process from study of language.

Analog computers, as distinct from digital computers, operate according to specific amounts or magnitudes of information which vary in a continuous manner. An example of this is the slide rule which represents conceptual relationships between number systems and arithmetic operations via a set of mechanical scales. Still other examples are thermostats and pressure gauges which translate certain features of a larger system into mechanical forces and movement in springs and dials. The magnitude and direction of these forces and movements are analogous to forces, movements, temperature and pressure

in the system the instrument represents. Humans convey and perceive vast amounts of information in such a manner. Color, shape, size and odor are types of information that an individual can receive and process in an analog way. Both animate and inanimate objects communicate such information. Nonverbal behavior such as body movement and posture, voice tones, rhythms and inflections, gestures and other expressions both overt and covert, are all types of analog information well within the capabilities of human operants. Social and physical environment and other contextual cues also convey analogic communications. Context has frequently been taken for granted because it is rather obvious. Contextual cues do constitute critical aspects of communication systems, and it would be a serious mistake to overlook this source of information (Lewin, 1938, for example, was well aware of these sorts of cues). Paivio (1974) criticises the tendency of many information theorists to use what is basically a block diagram of a digital computer to describe human cognition, an arrangement which omits any consideration of nonverbal communication.

The process described, then, is a dual coding approach. Luft (1970) says:

"Interpersonal communication takes place digitally and analogically (verbally and nonverbally) simultaneously. Verbal language is well adapted to the content part of communication, but is far less adequate for the relationship aspect. Nonverbal language conveys relationship information more adequately, but is less precise for defining the content of the relationship. (p. 59)

Figure 1 graphically describes this process which will hereafter be referred to as the CIP model. Our sensory organs are initially aware of stimuli present in our environment at any locale and time.

For various reasons we make decisions to attend primarily to some particular action, object or individual. We then attempt to process as much information as possible, and as precisely as possible about the stimulus object, action or individual. This requires the simultaneous processing of both verbal and nonverbal information.

Possible Neurological Basis for an Integrated but Dual System of Information Processing

The schematic of the CIP model shown in Figure 1 suggests that nonverbal information is directly discriminated because it is in analog form and needs no transformation to extract its meaning. Values are associated with the information concerning magnitude of presence, affect and imagery comparisons. Verbal information first must go into a transduction stage. At this point verbal information probably is processed much as a compiler on a digital computer processes its symbolic input. That is, the symbolic bits of information are compared with the individual's cognitive format, which is grammatically dependent, and those symbols that are compatible with a particular individual's language and/or dialect are thus transduced or compiled into the language of the brain or "inner speech." This process extracts the semantic meaning from any verbalizations attended to (Vygotsky, 1962). Regardless of the language used, the storage, retrieval and computation of information by a digital computer is done in the exact same way. The difference that various languages create is at the compilation stage. In human cognition the probable difference in processing of verbal information is at the transduction stage

of human cognition, where the semantic meaning of arbitrary sets and sequences of visual language symbols and or sounds is decoded according to the linguistic rules of the individual's language and culture. A digital computer stores information as dichotomised series of magnetized and non-magnetized core. The neurological functions of the human brain may be very similar. Although their exact function are yet to be described, it is known that electrical current and induction are inherent in all neurological processes, and their presence and magnitude can be detected and recorded magnetically and graphically. It may be just these electrochemical neurological functions that perform the processing of information, and may be the universal process which is "inner speech." Inner speech regardless of the overt language of a person and his culture is probably universal and occurs at the point in information processing where verbal information is ready for transduction, discrimination, and conversion to inner speech.

The processing of information via inner speech is not necessarily, or probably, a conscious process.

"First there is no necessary implication that the effective process is conscious. Imagery and verbal processes are defined in terms of their functional properties, and experienced imagery and language behavior are simply conscious expressions of the activity of the underlying systems. Second, the content of information in one system is not necessarily dependent on or predictable from the other. (Paivio, 1974, p. 8)

". . . all real decisions are made and all information is stored in the infracognitive format. However, an instantaneous conversion to the cognitive (conscious) format is made, and as the result the illusion of cognitive logic is created." (Rose, 1972, p. 6)

Infracognition is meant to be synonymous with "inner speech," and also with Paivio's notion of an underlying unconscious process by which language and imagery are translated into meaning and action.

Figure 1 indicates that while both verbal and nonverbal discriminatory functions are equal rank processes, each can be active without the other, or both can be active concurrently. They may or may not also be processing the same conceptual information in a given situation as when two people carry on a conversation about the stock market but convey nonverbal sexual cues to one another about "making out." The degree of congruence between verbal and nonverbal meaning in human interaction is a widely studied phenomena and the basis for judgment of the quality and sincerity of human relations (Carkhuff, 1969, 1971).

Reciprocal activity between verbal and nonverbal activity is possible through the corpus callosum. The assumption that the two discriminatory functions of verbal and nonverbal information are interconnected is necessary to capture the idea that nonverbal information can be transformed into verbal approximations, or vice versa. There is evidence that suggests distinctive lobe functions of the brain (Ornstein, 1973). The right lobe seems to be specialized for the processing of nonverbal information while the left lobe seems to be specialized for processing linearly related bits of discrete or verbal information. It, therefore, may be justifiable to equate the connection between the two discriminatory functions shown in Figure 1 to the connection between the right and left hemispheres of the brain via the corpus callosum. It should be pointed out that a

physiologic basis for the CIP model shown in Figure 1 is not a necessary condition for its use. Rather, appropriate criteria for determining its value are how adequately it can describe and explain aspects of human behavior, action and cognition as they are observed in the interaction of persons and things in complex environments. Nevertheless the congruence of the CIP model with other areas of physiologic knowledge is interesting and might someday lead to an interesting area of research.

Cognition as Explained by the CIP Model

Both verbal and nonverbal information is stored in the form of schemas, or prior learned categories or concept systems (Bruner, 1957; Vinake, 1952; Piaget, 1973). As shown in Figure 1 there is a two-way route existing between the discriminators and the storage areas, with a possible corpus callosum or some other structural relationship also existing between verbal and nonverbal storage. The two-way relationship between the discriminators and storage is necessary for the interpretation of incoming information, both verbal and non-verbal and for the alteration of existing schemas which may exist in the two modes as well as for the use of other schemas which include both the verbal and nonverbal mode. For example, schemas concerned with edibles undoubtedly are receptive to both verbal information and much iconic, sensory, attitude and emotional nonverbal information simultaneously. Thus the total schema or concept system for "eating" or "edibles" may be considered to consist of both verbal and nonverbal prior learned categories or structures which when established become an integrated schema. A schema becomes stable when

the magnitude of difference between some new information encountered in some problem of "to eat or not to eat" and similar or related existing schemas are no longer in disagreement, or when the modification of an old schema has been completed to the individual's satisfaction. Beyond this point, new information only enhances the schema's dependability. Anderson (1971) maintains that after a point the consistent processing of new information that is isomorphic with existing schemas does not increase the generalizability of that schema, but only affects the degree of its acceptance, its perceived reliability and veridicality of perception.

Decision making can be thought of as being much akin to the iterative routine used in the solution of implicit equations.

There is no known algorithm for the solution of implicit equations. They can only be solved through iterative estimates of the unknown. The solution of an implicit equation occurs when no significant differences exist between the two sides of the equation. Likewise in human thought when no significant difference exists between what the schema predicts and what both verbal and analogical information sources present, that is the decision. It is the point at which the implicit equation is solved or the point at which the schema becomes stable and not easily modified in the future. At this point the iterative process stops and whatever behavior is encoded by the schema becomes manifest. Concomitant with this manifestation is storage or memory of the decision and the conditions under which it occurred as part of the utility or generalizability of the schema. Of course the system is cyclic and is immediately ready

to begin the whole process over given new incoming information, particularly if that new information is highly discrepant with past events and does not fit the schema which has evolved.

Another quality possessed by the CIP model is the capability to account for autoarousal. During times of isolation of the organism or the lack of significant incoming new external information, the decision making process can be used for reconsideration of existing schemas. Autoarousal is necessary to explain nostalgia, conscience, self-appraisal, reflection, and continued task orientation and goal seeking in the absence of reinforcement. In fact, the results of autoarousal will often lead to the origin of new behavior and new conceptual schemas. This type of reflective thought play which is basic to much human activity can only be explained by cognitive systems similar to the CIP model presented in Figure 1. Many simplistic models of learning and thinking ignore this important phenomena.

Parsimony of the CIP Model

On the preceding pages attempts have been made to describe a system of cognition as suggested by the work of many researchers and theoreticians. To adequately understand the effects of one individual's behavior on another, as in the problem of biased expectancies and the self-fulfilling prophecy, it is necessary to construct a conceptual model suitable for explaining how humans go about coping with their environment. The suggested CIP model or some similar model, is a necessary first step. Its purpose is to define a simple system that allows the description of complex human behavior in realistic environmental settings in a manner that permits quantification of key variables.

The CIP model described in Figure 1 seems at present to fulfill this need while at the same time suggesting some changes in the traditional notions about human behavior which have guided the conceptualization and design of expectancy research. The literature is replete with studies dealing with attitudes, expectancies and other very closely related concepts. In fact, it is sometimes difficult to delineate any difference between these concepts. Studies dealing with expectancy and attitude phenomena seem to possess many common approaches and definitions. A possible reason for this conceptual confounding of constructs is that these concepts are so closely related that they are in fact not different, but only slight variations of the same phenomenon. To be more exact, concepts such as expectancy and attitude are probably nothing more than different manifestations of single cognitive schemas. According to the CIP model this situation is not only possible, but is highly probable. The essence of the CIP model is the use of cognitive schemas as the basic problem solving and storage unit in human thinking and behavior. If interpersonal relations are conceptualized as the result of a single system such as the coping schemas developed by the cognitive processes of the CIP model shown in Figure 1, rather than an infinite multiplicity of temporally chained events, then their understanding may be greatly facilitated.

Social Milieu and The Cognitive Information Model

This section describes how the CIP model based on the notion that stimuli are informers rather than reinforcers, can be utilized to describe the social milieu of only one or of an infinite number of

individuals. A basic assumption critical to the CIP model is the contention that most human behavior is the result of a single cognitive processing system. On several previous occasions it has been pointed out that the CIP model assumes every human endeavor is an act of communication. The social model is nothing more than the extension of behavior as described by the CIP model to social conditions. Another condition implied in the CIP model, but not previously explicated, is the assumption that human behavior and wisdom is not infinite. Both behavior and wisdom can be described as acts of communication. Both are very much limited by a definite set of parameters which govern the system of thinking and communication presented earlier and represented by the CIP model.

Extension of The Cognitive Information Model to Explain Social Behavior

Any system of human cognition is not complete without considering social milieus and how they systematically affect its members. A simple description of cognition does not, and should not, have to do this job, but it must be an integral part of an explanation for the operation of any social system. Lewin and his associates were well aware of the importance of understanding the effects of the total social and physical situation. In fact, his field theory is an attempt to explain an individual's social press. His notions of cognition never significantly surpassed the idea that needs lead to a state of disequilibrium. While this is not an invalid thought, it is far too generic to allow for precise descriptions of societal influences. Consequently, attempts at delineating social variables

led to extremely complex explanations. This is not to downgrade the work of Lewin, for he did not have the benefit of the present day body of knowledge and research tools. In spite of this, he recognized that humans spend a lot of time and effort trying to cope with their environment, recognized that simple contiguity and association theories of learning were inadequate to explain much behavior, and attempted to understand why and how the tasks of social communication, cooperation and organization are accomplished.

Need disequilibrium may be a good descriptor of behavior manifestation. It is not, however, an adequate basis upon which to build a system of cognition and social interaction. Human social systems are the result of multiple individual members of the species attempting to survive together. It stands to reason that the traits of a human social system must indeed be the result of human cognition as well as direct effects or products of interpersonal relations. If we assume that the most basic striving that man is capable of is survival and the perpetuation of the species, and that social groups were originally formed to increase the likelihood of individual as well as species survival, the functioning of the social system can be described in terms predicated on a system of cognition adequate for explaining complex social-cognitive behavior. When that cognitive system is described in terms of information processing, social systems most assuredly can be defined as communication systems.

As mentioned earlier, metacommunication theory presented the notion that human behavior is the result of interpersonal communication. The key underlying concept is information. In the CIP model

of human thinking presented above, an attempt is made at describing the process of internalization of information by an individual. Information cannot be internalized and used socially, cooperatively or to create self-fulfilling prophecies if it is not passed back and forth between individuals, e.g., communicated. Interpersonal communication is itself a system and more specifically can be described by the extension of the same construct whose description was begun with the CIP model.

Assuming that all human behavior is in one way or another an act of communication, then the activity of the social group can be characterized in terms of processing information just as can individual cognition. In the previous description of CIP model, importance was attributed to the necessity of considering the dual coding systems of verbal and nonverbal information and how they are used. The same importance exists when projected to social interactions. Some additional qualities become important. These qualities are not so much traits of the verbal or nonverbal mode, but are actually characteristics that are universally present in all interpersonal communications. These include the source of information, the context in which it occurs and the content of the message.

Universal Characteristics of Interpersonal Communication

Inherent in any act of communication is a source, or communicator of information. This is true even when the source is an inanimate object, or when there is nothing more than a general context or social and physical environment with no particular selectively attended to message or event. Likewise, an information source is universal to

all situations whether the messages received are either verbal or nonverbal. Consequently, one of the most important traits of communication is the esteem of the information source in the eyes of the receiver. For example, being told that the sky is falling by a drunken derelect surely does not have the same believability as being told the sky is falling by a noted astronomer. When the source is removed from the immediate milieu and the content is transmitted by written word, it seems that source importance and believability varies positively as writing goes from manuscript to typeset printing. There is probably some truth in the adage, "Power of the Press" because of the veridical status accorded to printed material and/or journalistic reporting by individuals' concept systems.

Context has the ability of not only varying the credibility of content but can just as easily influence the positive or negative nature of the message. Context is the background information in which a given information source is perceived. For example, the message that the sky is falling even though it is being announced by a noted astronomer, has a different impact in a formal lecture before a learned scientific society than it would have at a new year's party where jokes are being told.

The other universal trait in any act of communication is the message content intended to be transmitted. Content, in spite of the source influence, can vary independently. The influence of content can also vary as to format. In this case format refers to the form, complexity and arrangement of information. For example messages meant to convey academic ability about a child will most certainly

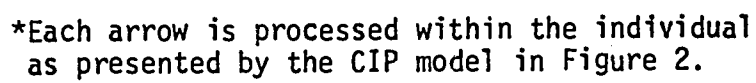
not have the same impact if one message simply states that "this student is a capable learner," while the other says, "this student was shown to have a verbal IQ of 140, and a performance IQ of 138 with a full scale IQ of 139 as measured by the Wechsler Intelligence Scale for Children." To some individuals, the latter statement will be more influential, while to individuals, not familiar with intelligence tests, the former statement might be just as influential, or possibly even more influential, because they lack the appropriate prior learned schema by which to assimilate the information in the more complex statement. To reiterate, it is highly important to consider the format of the content as information, itself, and to account for format effects, just as any other important variables should be accounted for in any type of study dealing with human behavior, both intrapersonal and interpersonal.

Source-Content Dyad and The CIP Model

The source-content dyad is considered by many to be the basic descriptor of communication (Wyer, 1970, 1973; Anderson, 1971, Hovland, Janis & Kelley, 1953). It is also this notion that has been chosen as the basis for the generalization of the CIP model shown in Figure 1 to a social communication model, shown in Figure 2.

Figure 2 is a graphic representation of the proposed generalization of the CIP model to explain the usual social communication system. Henceforth the model in Figure 2 will be referred to as the CIP/SI model. It should be mentioned that, unlike the CIP model which is a process model, the CIP/SI model is a product model which varies

Cognitive Information Processing/Social Interaction Model (CIP/SI)



according to the individual's social milieu being represented. What does not vary is the nature of the basic traits, that is the source, content, and the multiple events which communicate information. Only their number and amount varies. For example, a two-month old baby might have a very simple milieu structure. Possibly it would contain only three significant stimulus individual or object entities, one for each parent and one more for each significant object. A diagram for a typical twelve-year old child's social environment would be considerably larger. By this age most children have developed significant other stimulus individuals and objects (SIO), notably teachers, peer individuals, more distant relatives, money, bicycles, etc. Nonetheless, both the two-month-old baby's and the twelve-year-old child's social milieu can be described by a communication conceptualization, without an increase of basic environmental components, using only the constructs of source, content and of information perceived and acted upon or communicated between environment and person. The process by which information is perceived and acted upon (communicated) is described by the CIP model in Figure 1. The social purpose and context of this within and between self cognitive communication activity is described by the CIP/SI model in Figure 2.

The CIP model in Figure 1 is basic to the CIP/SI model in Figure 2. All those two way communications between SIO's that represent other humans, including the receiving individual, are explained by the CIP model. That is, the way any given individual copes or perceives, derives meaning from, and acts on the basis of information from other objects, events, and persons in his or her environment, is described

by Figure 1. Messages from the SIO's such as dogs, cats or any other infrahuman species can be best thought of as being represented by only the non-verbal portion of the CIP model in Figure 1. Even though animals do communicate through the use of laryngeal sound, that sound is without syntax and semantic meaning, at least as far as humans are concerned. This being the case the information transmitted via a bark or meow is not the result of symbolizing, but is only nonverbal information, interpretable only according to its magnitude, frequency, and intensity, in a direct analog rather than a semantic (digital) arbitrary symbol form. The processing of those messages by the receiver from those SIO's that are inanimate objects and which send messages can be explained by the CIP model, from the standpoint of the information they transmit on the receiving individual who processes the information in the same usual two ways. Most inanimate objects transmit to the human receiver sensory cues which are processed by the analogy mode. Other inanimate objects such as printed signs and audio tape instructions transmit information to the human receiver via the symbolic or verbal mode. Like any other SIO some inanimate SIO's also possess the capability of two way communications with the human receiver. As an example, a motorcycle may provide feedback to its rider about the surface of the highway, the degree of bank necessary on a turn and the correct speed to enter that turn, but the motorcycle, by definition does not think. Yet it does respond in an interactive way with its human operator. There is two way communication. It does communicate and in the interval of its use as a SIO while being ridden, it provides information to its rider who uses

this information (nonverbal mode) to make decisions. The rider's cognition is characterized by the CIP model in Figure 1. His "social" interaction with the motorcycle and other people and events which are SIO's for his business of motorcycle riding is characterized by the CIP/SI model in Figure 2. However, the motorcycle, or the road, or a rock, while they may be SIO's in certain situations and while they may communicate to the rider, are not themselves capable of cognition.¹

Figure 2 represents a hypothetical primary aged child, and is only one of many possible ways to graphically present the CIP/SI model. The individual concerned is placed in the euclidian center of the graph consistent with an egocentric view of the world which is commonly recognized as a human condition impossible to ever totally escape even in adulthood (Piaget, 1973). Each and everyone of us acts as our own communication center. Unlike Lewin's Field Theory, which tried to represent environmental influence in terms of euclidian position, distance, and size the CIP/SI model represents influence in terms of the importance of the source-content dyad. Consequently, relative

¹Some would argue that this assumption is not valid in the case of electronic computers. They argue that computers are life forms (Kemeny, 1972) and that with very minor adjustments to the definition of what constitutes a life form there would be no problem in accepting this assumption. This notion is rejected at least for the present. There are a number of activities that both humans and infrahumans are capable of that, as of yet, are not in the realm of computer behavior. For example a computer needs an external source for arousal. Humans, as well as other animal life forms, are capable of autoarousal. Computers can only react to schemas input from some external source. Animals are born with certain schemas such as sucking, grasping, visual tracking of moving objects and attending. In addition animals are capable of self preservation and self perpetuation, computers rely on external maintenance, and creation.

position of each stimulus individual or object (SIO) is unimportant. What is graphically important in this particular presentation is the relative size of the figure which denotes the influence of the stimulus. Instead of lines denoting interaction, broad arrows are used. This graphic quality allows their subdivision into parts representing verbal and nonverbal information. The broad arrows that are formed with broken lines indicate the source to be vicarious, where the individual is a witness in the present or in the past through reflection, to an on-going communication between others. There are interactions between the mother and father dyads as well as interactions between the parents and the teacher that the child observes but does not contribute to. Some of these are real and some are artificial such as those encountered in literature and film. Nonetheless, information is communicated to the child vicariously with the source being the context of its mother-father, parents-teacher and grandparent-parents dyads. Although the CIP/SI model in Figure 2 shows only two such interactions, there can be as many as necessary to produce a graphic that is isomorphic with the individual in question. It should be clearly noted that social milieu and lines of communication are dynamic and consequently vary over time as selective attention varies with situational events according to the CIP model in Figure 1. No where are there lines or symbols representing feedback. According to metacommunication theory, feedback is in reality an act of communication, and consequently instead of feedback two-way communications are represented, where existing, by double arrow heads in opposing directions.

Experimental Application of The CIP/SI Model

For experimental considerations the social condition should be described in as close a time and situational framework as is possible and practical to describe adequately the performance under study or experimentation. The dynamics of the social field offers some problems of measurement, but since changes in SIO's, the addition of SIO's, and change of context, such as some significant change in normal venue of activity, significant change of communication techniques with environment and the like are observable. Therefore the measurement advantages realized from such changes might possibly negate the disadvantages. For example, if as the result of a field description, a counselor learns of a double bind communications situation in which his client is trapped, and if as according to metacommunication theory, this is a cause of emotional problems, the counselor can intervene accordingly. After intervention accurate evaluations of change can be performed through a description of the altered field. A series of redescriptions would allow the mapping of the direction of change as well as the measurement of the magnitude of the interventive effects.

With a system based on two simple main observable constructs, quantification is relatively easy, if the nature of the constructs and how they affect each other is understood. Anderson (1971) as with the assumption in the individual case, gives good reason to suspect the relationship between source and content is interactive. This being so, the mathematics necessary for the description and measurement of the statistical interactions between mean values of

measured points of any traits in some sample are already in existence. The precise understanding of the statistical interactions of data from experimental studies may identify problem areas useful to developing theory for describing the general social Gestalt. Because all communication acts contain verbal and/or nonverbal information, and are transmitted via the source-content dyad, then not only is it possible to measure interactions of the metacommunication of one source-content dyad, but all interactions with any or all other significant dyads in one's social milieu in any given environmental situation to the extent that these variables may be quantified and experimentally manipulated. Consequently appropriately designed experimental studies may aid in the refinement and further development of theoretic constructs suitable to explain many aspects of human life where the information source and the content of the message jointly communicate a given expectancy.

Some hint to the nature of the larger theoretic Gestalt is presented in the communication model. Instead of the notion that a Gestalt is larger than the sum of its parts, the CIP/SI model suggests that the Gestalt is nothing more than the illusion created by the interaction of information communicated by all of the significant SIO's in one's social milieu at any given time in any given situation. The illusion is different than any of its parts in isolation, but certainly not greater. Rather it is a collective inference based on the sampling of much different data and their translation into meaning and action schemas. According to the model, the differences

between a Gestalt and its parts are analogous to the relationship that exists between a chemical compound and its constituents.

Ramifications

There are a number of possible ramifications for the CIP and the CIP/SI conceptual models just presented. Of course, as with any model or schematic, applications are dependent upon the degree to which the model does accurately and parsimoniously describe the behavior for which it was invented. Unlike many constructs, these models suggest methods of verification and refinement through the manipulation of their parts and the measurement of the systemic effects which result. For example, according to the CIP model one could, through the use of words, verify the supposition that format of the transduction stage is heavily dependent on the grammar and vocabulary specific to that used in the acquisition of language by individuals from their cultural heritage. Rose (1972) used semantic differential scales and partially verified this notion for common words supposedly highly denotative in their meaning. Persons from different cultural backgrounds perceived these words, not in the same, but in very different ways. Their linguistic schemas transduced the same identical stimuli of printed verbal symbols into different semantic meanings. By mechanically verifying the verbal and nonverbal information, as well as the source/content dyads, it is possible, through measures of actual behavioral events at the manifest stage, to verify and/or refine the total cognitive model.

Part of the CIP/SI model verification concerns its ability to prescribe, to diagnose, and evaluate human social interaction and

problem solving situations, to classify existing research results, and to aid in the design and choice of future research concerned with a wide range of human social behavior, including expectancy and the self-fulfilling prophecy phenomena.

It was noted earlier that while the notion that expectancies are normal and rational and not inherently bad, little overt recognition of this fact has occurred in the literature and few attempts have been made at describing the epistemology or etiology of expectancies. None of the linear models or paradigms for expectancy behavior have addressed this problem (Brophy & Good, 1970; Finn, 1972; Mason, 1972a). The present model is capable of aiding in the explicit description of how expectancies, as a type of cognitive schemas in general, are developed. This knowledge is necessary for realistic and systematic investigation of the effects of false information on human judgment. If, as suggested, expectancies are the result of multiple and cumulative sources of information, then delineation of the major theories for explaining both rational and irrational expectancies can be accomplished through step by step measurement of the effects of significant source-content dyads in an individual's social milieu or field which can be experimentally manipulated, operationally defined and measured.

If the main effects of verbal, nonverbal information, and source/content dyads can be placed on orthogonal interval scales, then it should be possible to get some precise notions of the part each main effect plays in the compounding of the interactions that describe the

Gestalt which results. Through the use of likelihood functions one can systematically vary the parameters of the Gestalt. Thus synthetic causes and effects can be generated and then verified or rejected through actual empirical studies. These types of studies not only allow for the refinement of the model but also aid in the systematic understanding of expectancies. Thus, theory more adequate for explanation of the operation of the self-fulfilling prophecy may be developed.

For example, with one subject, a researcher could, over time, very carefully and systematically vary source, content, context, and combinations of verbal and nonverbal information. The results of each variable could be measured on paper via latent trait functional measurement scales, or by physiological measures. From these measures values of interval rank could be assigned to each condition of the above components because by definition latent and functional scales yield interval measures. The next step in any such study would be the generation of densities or multivariate distributions for the purpose of quantifying the one to the other as it exists during the induction stage. This step plus the initial measurement step should provide discrete scales for accurate measurement of each component as well as their interrelations or interactions.

The third step in such an experiment would be to use likelihood functions, to predict the overall effect of the manipulation, the increase or decrease that is the experimental consequence on one or more of the initial components. Hypothetically this could be done by combining a weak source with an important content, by combining a

strong context with a weak source/content dyad, or any number of other possible combinations from the original expectancy which is to be induced.

Lastly, with the information generated from the above steps, the researcher could go back to the subject and replicate or explain in real life situations those effects predicated from experimental manipulations. The results of the synthesis of a model for that person and actual test results could be compared via any number of inferential tests of statistical significance.

AN EMPIRICAL TEST OF ONE SET OF IMPLICATIONS OF THE CIP/SI CONCEPTUAL MODEL

A study was conducted for the purpose of testing one set of empirical implications suggested by CIP/SI conceptual model. More specifically, the study investigated how the gradual accumulation of information and the relationship of the source and content of information may effect teachers' perceptions and ratings of trust, social ability, and academic ability of individual students.

The two primary questions that the study sought answers to are:

1. Do teachers, as a group use new information to readjust their expectancies of students rather than form quick and stable expectancies on the basis of a few initial cues?
2. Are some information sources held in higher esteem than others by teachers, and if so, what influence does this information have on the expectancy which is formed by teachers?

Rationale for the Choice of the Study

Inherent in the self-fulfilling prophecy notion is the effect information can have on the treatment of one individual by another. While many studies have been conducted in which a teacher is given false information about a student(s) on one occasion only, hardly any have attempted to investigate the effects of the accumulation of information over time. Furthermore, no real attempts have been made to consider as experimental variables the source-content information dyad, the context of information exchange, or the immediate and long range effects of information accumulation.

The present study emerged from the CIP/SI conceptual model which considers the source/content dyad and context as components of the system by which humans develop expectancies. In this study information, content and source are manipulated in order that both their independent and interactive effects can be measured.

The cumulative effect of information upon expectancy formation was also considered by systematically increasing the amount of information received by teachers about a given student. Prior educational research is almost devoid of this type of consideration. Outside of some theoretical suppositions in other related disciplines, little is known about how humans use information in the development and use of cognitive schemas (i.e., expectancies) in real life contexts. This knowledge appears to be essential if the relationship of biased expectancies and the self-fulfilling prophecy are to be understood.

Figure 3
Design of Empirical Study

CUMULATIVE GROUPS	Source/Content Groups		SEX OF SUBJECT	
	Source	Content (Valence)	M A L E	F E M A L E
GROUP 1 NO ADDITIONAL INFORMATION	NONE			
GROUP 2 ONE BIT OF ADDITIONAL INFORMATION	Teacher	Neutral		
	Parent	Neutral		
	Neighbor	Neutral		
GROUP 3 TWO BITS OF ADDITIONAL INFORMATION	Teacher Parent	Neutral & Positive		
	Teacher Neighbor	Neutral & Positive		
	Parent Teacher	Neutral & Positive		
	Parent Neighbor	Neutral & Positive		
	Neighbor Teacher	Neutral & Positive		
	Neighbor Parent	Neutral & Positive		
GROUP 4 THREE BITS OF ADDITIONAL INFORMATION	Teacher Parent Neighbor	Neutral, Positive & Negative		
	Parent Neighbor Teacher	Neutral, Positive & Negative		
	Neighbor Teacher Parent	Neutral, Positive & Negative		
	Parent Teacher Neighbor	Neutral, Positive & Negative		
	Teacher Neighbor Parent	Neutral, Positive & Negative		
	Neighbor Parent Teacher	Neutral, Positive & Negative		
	Teacher Parent Neighbor	Neutral, Positive & Negative		
	Neighbor Parent Teacher	Neutral, Positive & Negative		

Design of the Study

The design used in this study is a multivariate mixed effects model. Subjects were randomly assigned to four main random effects (i.e., information groups, Figure 3), while the main fixed effect, sex, was dependent on the random assignment of the former groups.

Statistical analysis was carried out by multivariate analysis of variance as described by Bock (1967), using the computer routine developed by Finn (1968).

Teacher subjects were asked to rate a hypothetical student on the three opinion or attitude scales of trust, social ability, and academic ability which measured these traits as perceived by the teacher of the student. The rating took place after subjects have viewed a silent video tape of the object child functioning in the classroom and had been given either no additional information other than that given in the video tape, or one additional bit of information, two additional bits of information, or three additional bits of information. Only one video tape depicting one child was used. Two of the main random effect groups, the two bits, and three bits conditions were further divided as to all possible permutations of source and content. In this study there were three possible permutations each of source and content. Consequently this resulted in six possible source/content dyad permutations for both the two bit and three bit groups. Although the one bit group was given one additional bit of information content, the content was attributed to all three possible sources (see Figure 3). This fact caused the one bit group to have only three permutations.

The one single video tape used in this study was produced in an actual classroom. It isolated and followed only one individual student. This student was ignorant of his selection as the prime target of the tape. The tape depicts an innominate sixth grade boy innocuously functioning in the classroom. During the thirteen minute saga shown on the tape, specific episodes of interaction occur between, (1) the student and his peers; (2) the student and his teacher, while the student is involved in project work and classroom routine, both seated and peripatetic. No unusual extraneous events occur during the duration of the tape. This tape is one of a series of tapes developed by Barclay (1972).

Sources of Information

Through prior measures (Stilwell & Rose, 1975) three information sources were found to vary in the magnitude that other teachers perceived them as being reliable. The three sources are other teachers', parents, and neighbors.

Teachers are probably the most available source to which any teacher is exposed. A teacher communicates with other teachers in the lounge, at lunch, as a team teacher, in the hall, and at various social functions. Consequently the relationship between teachers is unique in that both are of equal professional rank. This condition allows a more direct and honest interaction to occur an expressions of opinions that are more congruent with actual feelings. This condition was supported when a group of teachers were asked to rank order, according to reliability, various sources of information.

Source two is a parent of a neighboring child, who carries information about the object child to school, and in particular to the teacher. The adult neighbor, unlike the teacher, was usually viewed by teachers, in the aforementioned poll, as providing unreliable information sources.

The third source used in this study was a parent of the object child. Teachers', as a group, seemed to view parents as ambivalent sources of information. The parent is possibly a source that is believed or not believed as a result of the content of the information being communicated.

These three sources of information about the student were chosen to be the representative sources of the study because of two considerations. The first consideration is the suggestion that these

sources differ considerably as to their believability, and each represents a significantly reliable, unreliable, or ambivalent source of information as seen by teachers and as determined experimentally previously. The second consideration for selecting these particular information sources was the fact that all three could easily preface a common message or content statement about the student. It is these sources of information that are defined as SIOs by the CIP/SI model.

Content Justification

It is a rare occasion, in the real world, when one receives information about another individual that is unanimous in either a

positive or negative direction. More often, it is the case that one receives both positive and negative information as well as all possible nuances of the two. One of the purposes of this study was to examine the effects of cumulative information about an individual, a student, on the expectations possessed by another individual, the teacher. This suggests that the presentation of negative, neutral, and positive bits of information content parallel the conditions that one is apt to encounter in real life communications about other persons.

Subjects and Sampling

There were 240 subjects involved in this study. All subjects were elementary teachers-inservice. The sources of the subjects are shown in Table 3.

Table 3
Description of Subjects

Site	N	Characteristics
Breathitt County Kentucky Schools	19	Rural Locale
Wolfe County Kentucky Schools	25	Rural Locale
Powell County Kentucky Schools	17	Rural Locale
West Clermont Ohio Schools	79	Suburban Locale
Teachers in University of Kentucky and Eastern Kentucky University Graduate Programs	100	Mixed Locale

The choice of the sample populations was the result of two considerations. The first was the desire to get a sample from a population that was fairly representative of all possible teaching conditions, rural, suburban and urban. The second consideration concerned what populations were available. Attempts to acquire an intact urban population proved impossible. As a substitute urban sample, teachers-in-service taking graduate courses during the summer term at the University of Kentucky, and Eastern Kentucky University were used. While this sample can in no way be described as a true urban group, many of these teachers in the sample came from Louisville and Lexington. West Clermont School District is almost totally a middle middle-class residential area, while Breathitt, Wolfe, and Powell Counties are totally rural. The largest town in either county is approximately 2,500.

Experimental Manipulation of Treatment Conditions

In order to maintain control of the experimental condition, precise instructions were written. These included an introduction, as well as instructions for subject participation and an informal debriefing.

Nine sessions were necessary to collect the required 240 subject response sets. The subjects were seated in rows or semi circles situated in front of a TV monitor. The type of packet an individual received defined the experimental treatment to which an individual was assigned. The order of the packets was determined by prior ran-

dom arrangement, therefore subjects were randomly assigned to treatments. The packets were dispensed by row, starting from the left-hand side of each row. Each packet contained three rating scales that were consolidated into one series. One set of sixty packets, the control treatment, did not contain any additional information other than that communicated via the video tape. Another set of packets, the second treatment, contained one additional bit of information. Another set of packets, the third treatment, contained two additional bits of information. The last set of packets, the fourth treatment, contained three bits of information. Within the one, two, and three bits of information packets, all possible source/content dyads for each possible combination were present.

All content statements contained information that referred to each of the three traits being measured, which were trust, social ability and academic ability. The neutral content statement was presented in the one bit group, the neutral and positive statements were presented to the two bit group, while all three were presented to the three bit group (see Figure 3). All three contents in each group were connected systematically to each of the three possible experimental sources of SIO's. The order of dyad appearance in the two bit and three bit groups was alternated in an attempt to minimize any ordering effect.

After the subjects had recorded their responses and all packets were collected, a description of the nature of the study was given

to those subjects who expressed an interest in this information.

This explanation also included a brief description of CIP/SI model that directed the design of the study.

Instrumentation

The instrument used to collect the data for this study consisted of three scales randomly combined into a single list of items. The three scales were constructed especially for this study and calibrated through the use of latent trait analysis as described by Wright and Panchapskensen (1969).

The three scales were developed to measure perceived trust, perceived social ability, and perceived academic ability, as defined in table 1 below.

Table 1

Operational Definitions for the Key Traits

Trust	The feeling that generally accepted standards of responsible, ethical behavior most likely will be followed by a student, even without supervision.
Perceived Social Ability	The degree of social maturity that a teacher most likely expects to be demonstrated by a student in a given set of circumstances.
Perceived Academic Ability	The highest level of academic success that a teacher most likely expects from any particular student.

Items for each scale were written for the purpose of measuring small positive increments of the presence of each of the three traits. Thus, the response to each item was a dichotomy, indicating whether or not the trait was present in the magnitude measured by any particular item.

Adequacy of the Experiment as a Test of the CIP/SI Model

The present study is primarily constructed around the CIP/SI model. It is an attempt to determine what influence information sources, content, accumulation, and their interactions have on expectancy schemas. The model clearly states that all of these variables interact to develop, alter and refine the cognitive schemas of individuals.

Since all of the independent variables in the design were created according to the constructs of the CIP/SI model, all results can be directly generalized to this model. For example, the model states that both source and content vary independently as to importance, but the overall effect that they have on the acceptance of a bit of information is the result of the integral interaction between the two as perceived by an individual. The results will be in a form such that independent values for both content and source can be realized as well as their interaction value. This is a condition which permits model refinement and a more concrete understanding of this very basic quality of all communications. In addition, the results of the accumulation of information should also be generalizable to the notion that people continuously alter their schemas as new information is received.

There are three important strengths in the design of this study.

Unlike past studies based in S-R theory, the model in this study allows the investigation of social interactions. That is, the communication paradigm allows the contribution of each discrete part of social interaction to a final expectancy formation to be quantified. The second important strength of this study is the use of a more powerful measurement technique, latent trait analysis which has not before been reported in the literature of expectancy research. Latent trait measurement theory allows for the generation of interval data that is sample free. Consequently, more accurate measurements of small positive increments of the criteria can be accomplished. Third, portions of the study were designed to be orthogonal, which makes the unconfounded interpretation of main effects and some interactions possible.

The four major limitations of the present study are that:

1. It does not consider the personal social milieu of each subject.
2. It does not consider the differential effects of concomitant reception of verbal and nonverbal information.
3. The design used is not capable of looking at contextual influence, since this variable was held constant.
4. The capability of considering the long-range effects of source/content dyads and cumulative information on expectancy schemas of teachers is not possible within the limits of the actual experimental design.

Results and Conclusions

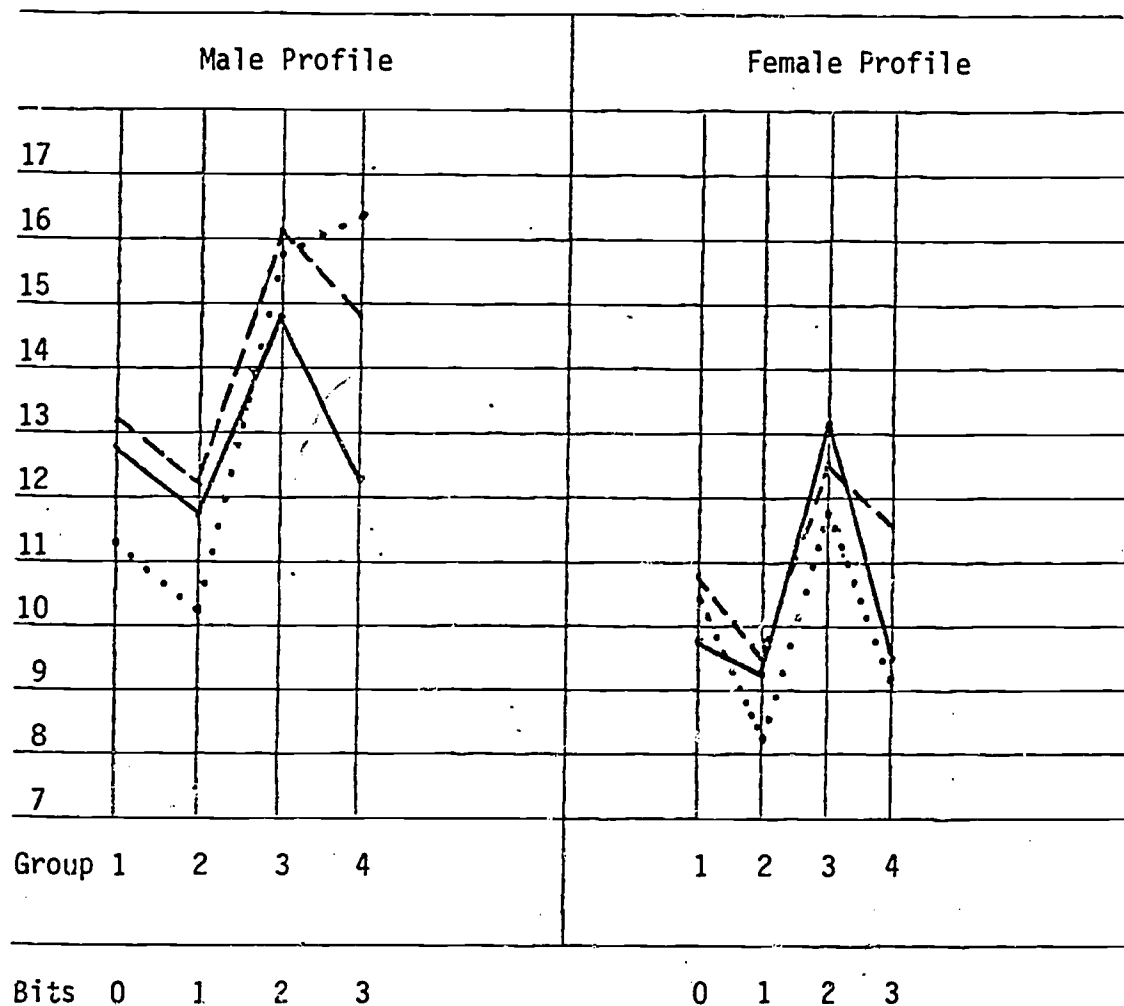
The treatment of the data has been reported in depth elsewhere (Rose, 1976), and will not be discussed here. Only the results, and the conclusions drawn from them will be presented.

Summary of the Effects of the Accumulation of Information

The data analyses revealed evidence that suggests that teachers as a group, constantly use new information to re-adjust their expectancies of students rather than forming quick and stable expectancies on the basis of a few initial cues. Additionally, it seems that male and female teachers react to negative information of a particular type about male students differentially, and that males consistently perceive the student as possessing a higher of the criterion traits of trust, academic ability, and social ability per amount of information available (figure 4). In fact, the pattern of results across the three information conditions and the control group (i.e., the zero bits of information group) is identical for male and female teacher subjects except for the reversal on the academic ability trait on the three bit treatment condition. This means that while male teachers consistently attributed more trust, social ability, and academic ability to the object child than did the female teachers, the pattern of results is the same across both sex groups. This is essentially a replication of results across both sex groups which support the same general finding that expectancies are cumulative and are developed over time and events.

Figure 4

Trait Means for Perceived Trust, Social Ability
and Academic Ability for Male and Female
Subjects as Information Accumulates



code

Trust

—————

Social ability

.....

Academic ability

Findings of the Empirical Study for the Effects of Source Esteem

Question two of the empirical study was concerned with whether some information sources are held in higher esteem than others by teachers, and if so how do these sources differentially effect the expectancy which is formed. The search for the answer to this question proved to be more complex and less successful than for question one. There were no significant effects found between the several experimental manipulations.

The CIP/SI model may explain why this portion of the study failed to yield the desired results. Both the CIP and CIP/SI models are predicated on the notion of the stimulus behaving as an informer. This says that internally each bit of information is used somehow in the development of the schemas that we use in coping with our environment. The process states that schemas or expectancies are developed over time as information accumulates. Question one of this study was primarily concerned with this notion. What seems, then, to have been overlooked in the planning of the study is the fact that a human source of information is judged by others to be trustworthy, accurate, etc., by the expectancy that the receiving individual has developed from past information over time for a particular source and not by a single bit of categorical information such as parent, teacher, and neighbor. Even though prior evidence suggests and supports the notion that teachers, parents, and neighbors are seen by teachers as generally varying in magnitude of reliability of the information they provide, this single bit of information did not effect the content to a degree that it could be measured via the paper and pencil instruments.

In summary, question two was not answered, in that all source/content dyad combinations proved not to vary significantly. A probable cause is that the design of the study overlooked an obvious fact that the magnitude of source esteem is as much a function of an expectancy as is any other judgment that individuals find necessary to make. For example, while teachers are viewed by other teachers as generally good sources of information, a particular teacher with a reputation for disliking blacks will probably not be believed, when talking about the behavior of some black child, to the degree that another teacher without a reputation of racial prejudice. That, after all, is the basis for stereotypes. Further research designed to adequately provide for the epistemology of an expectancy for the source, as well as how that source effects the veridicality and strength of content, should be conducted.

This type of study could be accomplished by systematically presenting information about various sources designed to develop their esteem to vary in magnitude in the eyes of various receiving individuals. Once it has become evident through measurement that the various hypothesized sources are held by the subjects to be of significant different esteem, the sources are ready to be used as criteria to test the effects of various sources on the impact of common content. In this study, had additional information been presented as to the character of the teacher, the parent, and the neighbor, maybe their veridicality would have been seen to differ significantly. In fact, the key variable in this area may not be the global designation of a person into some general category such as parent, teacher, neighbor, policeman, or physician, but characteristics such as the integrity, competence, ability, etc. of persons within these and other roles.

Conclusions

The results of this study have important implications for two major areas. These areas were revealed during the literature review and they are: (1) the prior lack of a model of expectancy that permits the systematic experimental investigation of the phenomenon, while at the same time being broad enough to be applicable to the actual classroom milieu of teachers and students, and (2) the degree to which one bit of information can be expected to cause a biased expectancy to be developed as compared with multiple cumulative bits of information over events and time.

The lack of an adequate model of expectancy was addressed earlier and the result is the development and presentation of a cognitive information process (CIP) and a social product (CIP/SI) model that together attempt to systematically describe how and why expectancies are formulated and how they operate. As a result of being constructed from a very simple notion that all human behavior can be described as an act of communication and can be subdivided into observable entities that permit quantification, the combined model appears to be capable of assisting in the design of studies dealing with many aspects of human behavior, as well as explaining the results in a manner that would prove more beneficial in applicational situations. This appearance is only conjectural. Proof of its utility and value as a research, diagnostic and treatment vehicle needs to be verified in actual use. The empirical portion of this study provided an initial test of the CIP/SI model and partially supports its value.

In the empirical study the CIP/SI model was used as the framework to design an experiment to seek information in two areas that had received little attention in educational research dealing with expectancies, the effects of the accumulation of information on the epistemology of expectancies, and the effects of the source on the content. As a result of the empirical study, evidence was gained to support the notion that teachers do not form quick and static expectancies; that each bit of information is used in an attempt to make the best judgment possible in a given situation. This information subsequently helps explain at least part of the cause for so many confounding results in earlier studies involving induced expectancies because in many of the past studies it was assumed an initial induction of false and/or biased information would establish an expectancy of sufficient magnitude to be maintained throughout the study. The results further indicated that the nature of the message (i.e., negative, neutral, and positive) selectively effected various criterion measures. That is, the overall change observed (or induced) through the introduction of each bit of new information, was not due to an overall shift as the result of the new information, but instead the overall shift was due to the differential of the message content on either one or two of the defined measures of trust, social ability, and academic ability, and in one instance an undefined criterion, which was being reflected on both the social ability and academic ability measures.

The results of the empirical study failed to produce the desired information about the nature of source esteem on the impact of information content on the receiving individual. However, a post hoc

interpretation consistent with the model characteristics but not earlier recognized, does suggest why this effect did not reveal itself.

In summary, it seems that the empirical study did yield results that verify the utility of the CIP and CIP/SI models in the area of expectancy theory and research. In addition both the conceptual and empirical portions of this paper do seem to shed new insight as to why so many confounding results have resulted for prior expectancy research. It also tends to confirm the ideas of those researchers, who in the past have suggested that the induction of a biased expectancy was a complex process that could not be accomplished through the introduction of a single bit of false or biased information.

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